

CM



CM Self-priming Quick guide

<http://net.grundfos.com/qr/i/98503799>



CM Service instructions

(all available languages)

<http://net.grundfos.com/qr/i/99698874>



CM Safety instructions

(all available languages)

<http://net.grundfos.com/qr/i/99126136>



CM Quick guide

<http://net.grundfos.com/qr/i/95121198>



CM

English (GB)

Installation and operating instructions 4

Appendix A. 23

安全上のご注意. 27

English (GB) Installation and operating instructions

Original installation and operating instructions

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1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.



The use of this product requires experience with and knowledge of the product. Persons with reduced physical, sensory or mental capabilities must not use this product, unless they are under supervision or have been instructed in the use of the product by a person responsible for their safety. Children must not use or play with this product.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



DANGER

Indicates a hazardous situation which, if not avoided, will result in death or serious personal injury.



WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious personal injury.



CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:



SIGNAL WORD

Description of the hazard

- Consequence of ignoring the warning
- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or gray circle with a white graphical symbol indicates that an action must be taken.



A red or gray circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

2. Product introduction

2.1 Applications

The pumps are horizontal, multistage centrifugal pumps designed for pumping of clean, thin and non-flammable liquids, not containing solid particles or fibres that may attack the pump mechanically or chemically.

2.2 Identification

2.2.1 Nameplates for the pump

The pump nameplates are positioned on the motor fan cover or terminal box.

Nameplate with pump data

The data and information on the pump nameplate are described in the table below. See the nameplate in the figure about pump nameplate with data in the appendix.

Type	①	Tliq,max	⑦	°C	⑦	°F							
Model	②	PMax	⑥	bar	⑥	PSI	⑥	MPa					
TAmb	③	°C	③	°F	TF	④	MEIz	⑤	η _p (%)	⑧	Insulation class	⑨	⑩
50 Hz	Q nom	⑪	m³/h	⑪	GPM	60 Hz	Q nom	⑪	m³/h	⑪	GPM		
	H nom	⑫	m	⑫	PSI		H nom	⑫	m	⑫	PSI		
	H max	⑬	m	⑬	PSI		H max	⑬	m	⑬	PSI		

TM056388

Pump nameplate with data

Pos.	Description
1	Pump type
2	Pump model
3	Maximum ambient temperature
4	Temperature class
5	Minimum efficiency index
6	Maximum system pressure
7	Maximum liquid temperature
8	Hydraulic efficiency at best efficiency point
9	Insulation class
10	Motor protection
11	Rated flow
12	Head at rated flow
13	Maximum head

Nameplate with approval marks

The data and information on the pump nameplate are described in the table below. See the nameplate in the figure about pump nameplate with approval marks in the appendix.

1				
GRUNDFOS 				
DK-8850 BJERRINGBRO DENMARK				
Made in Hungary				
1	2	3		

TM087928

Pump nameplate with approval marks

Pos.	Description
1	Approval marks
2	Company name and address
3	Country of manufacture

2.2.2 Nameplate for the motor

The motor name plate is positioned on the motor cooling fins.

The data and information on the motor nameplate are described in the table below. See the nameplate in the figure about nameplate for the motor in the appendix.

Nameplate for the motor

Pos.	Description
1	Capacitor size and voltage
2	50 Hz motor efficiency at rated work point
3	50 Hz power factor
4	50 Hz output power in kW
5	Frequency
6	Number of phases
7	50 Hz output power in hp
8	50 Hz maximum current
9	50 Hz full-load current
10	50 Hz rated voltage
11	Motor type
12	50 Hz rated speed
13	Frequency
14	60 Hz output power in kW
15	NEMA enclosure class
16	60 Hz output power in hp
17	60 Hz power factor
18	60 Hz motor efficiency at rated work point
19	Part number
20	Factory code
21	Production date (year and week)
22	Country of origin
23	60 Hz rated voltage
24	60 Hz full-load current
25	60 Hz maximum current
26	60 Hz rated speed
27	IEC duty cycle
28	Number of poles
29	IEC enclosure class

Pos.	Description
30	Insulation class
31	NEMA enclosure type
32	Motor duty class
33	Maximum ambient temperature
34	NEMA locked-rotor code
35	NEMA design class
37	CC122B mark
38	CE mark
39	cURus mark

TM063826

3. Receiving the product

The weight of the product is stated on the packaging.

CAUTION

Back injury

Minor or moderate personal injury



- Use lifting equipment which is approved for the weight of the product.
- Use a lifting method suitable for the weight of the product.
- Do not lift the product by lifting it in the packaging inlay.
- Wear personal protective equipment.

CAUTION

Crushing of limbs

Minor or moderate personal injury



- Avoid insecure stacking of the product.

The pumps are delivered from factory in a packaging specially designed for manual transport or transport by forklift truck or a similar vehicle.

4. Mechanical installation

Before installing the pump, check that the pump type and parts are as ordered.

CAUTION

Hot or cold surface

Minor or moderate personal injury



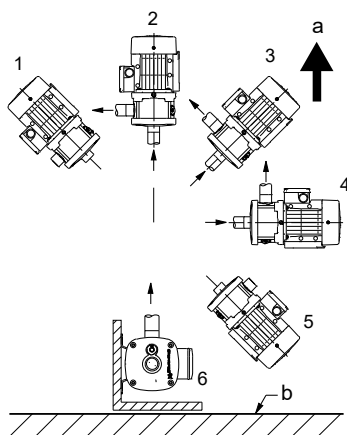
- Make sure that no one can accidentally come into contact with hot or cold surfaces.

4.1 Installation of the pump

Install the pump on a plane surface using the mounting holes in the motor base plate and a minimum of four bolts. Tighten each of the four bolts to a torque of 10 Nm.

Install the pump so that air pockets are avoided in the pump housing and pipes.

The below figure and table show the permissible pump positions.



Pump positions

Pos.	Description
a	Up
b	Floor

Pump position	Non-self-priming pumps	Self-priming pumps
1	-	-
2	•	-
3	•	-
4	•	•
5	-	-
6	•	•

- Mounting in this position is allowed.

Install the pump so that inspection, maintenance and service can easily be performed.

Install the pump in a well-ventilated location.

TM056389

4.2 Pipes

We recommend that you fit isolating valves on either side of the pump. It is thus not necessary to drain the system if the pump needs service.

If the pump is installed above the liquid level, a non-return valve must be fitted in the inlet pipe below the liquid level. See the figure about recommended pipes for a self-priming pump in the section on pipe connection (self-priming pumps).

Self-priming pumps

We recommend an opening pressure of the non-return valve which is lower than 0.05 bar. Otherwise, the additional resistance will reduce the suction capability of the pump.

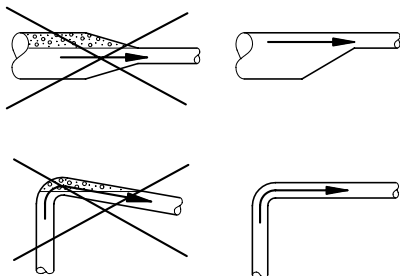
If the pump is to be used for pumping rainwater or well water, we recommend that you fit a filter to the inlet of the inlet pipe.

The pump must not be stressed by the pipes.

Install the pipes according to the design requirements given in EN ISO 13480-3:2012. Tolerances must comply with EN ISO 13920:1996, class C.

The pipes must be correctly sized taking due account of the pump inlet pressure.

Install the pipes so that air pockets are avoided, especially on the inlet side of the pump. See the figure below.



TM040338

Pipes

Related information

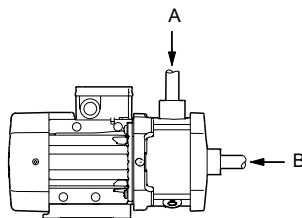
4.2.2 Pipe connection (self-priming pumps)

4.2.1 Pipe connection (non-self-priming pumps)



Take care not to damage the pump when connecting the inlet and outlet pipes.

Torque: 50-60 Nm. The stated torque must not be exceeded.



TM040358

Inlet and outlet ports

Pos.	Description
1	Outlet port
2	Inlet port

4.2.2 Pipe connection (self-priming pumps)

The pump must be installed correctly to ensure proper self-priming.

Take the following precautions:

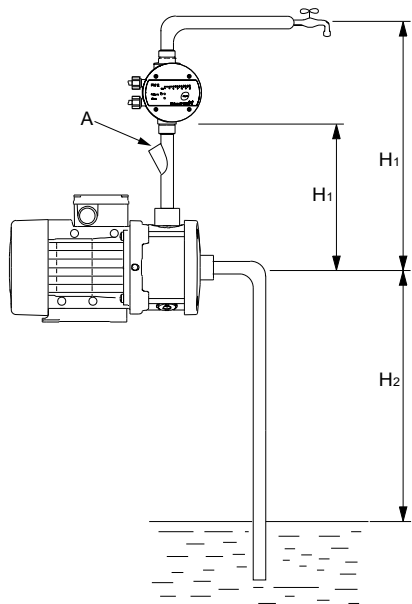
See the figure below.

- Observe the minimum height (H_1) between the centre of the inlet port and the first tapping point. If a pressure manager is installed, measure H_1 from the centre of the pump inlet port to the pressure manager. Minimum heights are shown in the table below.
- Ensure that the inlet pipe is positioned at least 0.5 metres below the liquid level (H_3).



For optimum suction performance, install the pump as close as possible to the well or tank. A short inlet pipe reduces self-priming time, especially when the suction lift is high.

We recommend installing a filling plug in the outlet pipe. This allows the system to be filled with liquid before startup. See the figure below, position A.



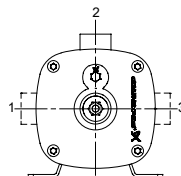
TM059415

Recommended pipes for a self-priming pump

Suction lift (H ₂) [m]	Minimum height (H ₁) [m]
4	0.2
5	0.35
6	0.5
7	0.6
8	0.7

4.3 Alternative connection positions

The pump is available with various connection positions on special request.



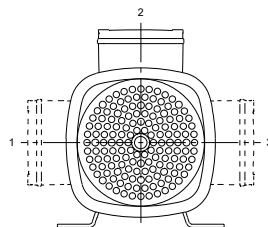
Alternative connection positions

Self-priming pumps

These pumps are only available with the outlet port pointing upwards, i.e. in the same direction as the filling hole.

4.4 Terminal box positions

The pump is available with various terminal box positions on special request.



Terminal box positions

TM038709

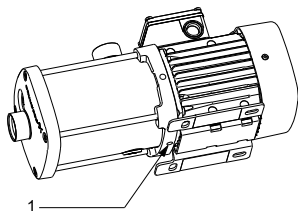
TM040357

4.5 Avoiding condensation in the motor

If the liquid temperature falls below the ambient temperature, condensation may form in the motor during standstill. Condensation can occur in moist surroundings or areas with high humidity.

In such cases, use a motor suitable for condensing environments such as an IPX5 motor available from Grundfos.

Alternatively, open the bottom drain hole in the motor flange by removing the plug. See the figure below. This reduces the motor enclosure class to IPX5.



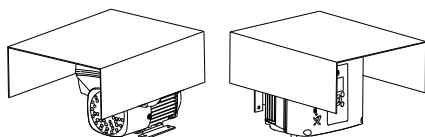
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Motor drain plug

Pos.	Description
1	Motor drain plug

The open drain hole helps prevent condensation in the motor as it makes the motor self-venting and allows water and humid air to escape.

When you install the pump outdoors, provide the motor with a cover to avoid condensation (not supplied by Grundfos).



TM053496

Examples of covers (not supplied by Grundfos)

5. Electrical connection

Carry out the electrical connection according to local regulations.

Check that the supply voltage and frequency correspond to the values stated on the nameplate.

DANGER

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.
- The pump must be connected to an external all-pole main switch according to local regulations.
- The product must be earthed and protected against indirect contact in accordance with local regulations.
- Wires connected to supply terminals, must be separated from each other and from the supply by reinforced insulation.



5.1 Power cable

In order to comply with the EN 60335-1 standard, the power cable must as a minimum be rated for an operating temperature of 105 °C (221 °F).

The power cable has to fulfil the 450/750 V voltage level requirement of an H07 cable. The allowed minimum cross section for the cables is 4 × 1.0 mm².

Cable gland

The power cable must be installed through a cable gland fitted to the terminal box in such a way that the IP class of the motor remains intact. The cable gland must be correctly sized so that it provides a seal around the power cable which fulfils the IP class of the motor, see motor nameplate.

Related information

[2.2.2 Nameplate for the motor](#)

5.2 Motor protection

Single-phase motors, 1 × 115 / 230 V, 60 Hz

These motors do not incorporate motor protection and must be connected to a motor-protective circuit breaker which can be manually reset.

Set the motor-protective circuit breaker to maximum 1.15 × I_{1/1}.

Single-phase motors, 230 V, 60 Hz

These motors have built-in motor protection and require no further motor protection. The motor protection is automatically reset.

Other single-phase motors

These motors have built-in current- and temperature-dependent motor protection in accordance with IEC 60034-11 and require no further motor protection. The motor protection is of the TP 211 type which reacts to both slow- and quick-rising temperatures. The motor protection is automatically reset.

Three-phase motors

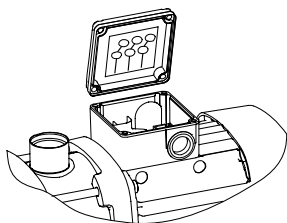
Three-phase motors must be connected to a motor protective circuit breaker according to local regulation. The circuit breaker protects the motor against rotor locking resulting from rapid temperature rise, as well as overload resulting from slow temperature rise. Set the motor-protective circuit breaker to maximum $1.15 \times I_{1/1}$. This covers motors with and without PTC.

Motors equipped with a PTC properly connected to the motor control system are protected against slow temperature rise caused by overload, failing cooling and two-phase operation. The PTCs are designed in accordance with the DIN 44082.

5.3 Connection of wires in terminal box

Carry out the electrical connection as shown in the diagram inside the terminal box cover.

If connected to a circuit protected by a fuse, use a time-delay fuse with the product.



TM038781

Wiring diagram

5.4 Frequency converter operation

You can connect three-phase motors to a frequency converter.

Depending on the frequency converter type, this may cause increased acoustic noise from the motor. Furthermore, it may cause the motor to be exposed to detrimental voltage peaks.



MG 71- and MG 80-based motors have no phase insulation ¹⁾ and must therefore be protected against voltage peaks higher than 650 V (peak value) between the supply terminals.

The above disturbances, that is both increased acoustic noise and detrimental voltage peaks, can be eliminated by fitting an LC filter between the frequency converter and the motor.

For further information, please contact the frequency converter supplier or Grundfos.

Grundfos CUE, Frequency converters for pump control



Self-priming pumps

If the pump is connected to a frequency converter, operation at low speed may cause the internal recirculation valve to open. This will result in a drop in pressure and flow.

6. Starting up the product



If there is a risk of condensation in the motor, remove the motor drain plug before startup and keep the drain hole open during operation. See the figure about motor drain plug in the section on avoiding condensation in the motor.

Related information

[4.5 Avoiding condensation in the motor](#)

6.1 Non-self-priming pumps



Do not start the pump until it has been filled with liquid.

6.1.1 Liquid filling

CAUTION

Hot or cold liquid

Minor or moderate personal injury



- Wear personal protective equipment.
- Pay attention to the direction of the vent hole when you fill the pump with liquid and vent it.
- Make sure that no persons are hurt by the escaping liquid.

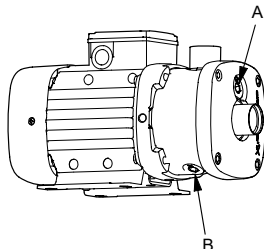
¹⁾ MG 71- and MG 80-based motors with phase insulation are available on request.



Pay attention to the direction of the vent hole during liquid filling and venting. Make sure that the escaping liquid does not cause damage to the motor or other components.

1. Close the isolating valve on the outlet side of the pump.
2. Open the isolating valve in the inlet pipe completely before starting the pump.
3. Remove the filling plug. See the figure below.
4. Fill the pump housing and the inlet pipe completely with liquid until a steady stream of liquid runs out of the filling hole.
5. Fit and tighten the filling plug.
6. Start the pump and slowly open the outlet isolating valve while the pump is running. This ensures venting and pressure buildup during startup.

The outlet isolating valve must be opened immediately after startup of the pump. Otherwise, the temperature of the pumped liquid may become too high and cause damage to the equipment.



TM038774

Position of filling hole and drain hole

Pos.	Description
1	Filling hole
2	Drain hole



If it is difficult for the pump to build up pressure, it may be necessary to repeat steps 1 to 6.

6.2 Self-priming pumps



Do not start the pump until it has been filled with liquid.

6.2.1 Liquid filling

CAUTION Hot or cold liquid

Minor or moderate personal injury



- Wear personal protective equipment.
- Pay attention to the direction of the vent hole when you fill the pump with liquid and vent it.
- Make sure that no persons are hurt by the escaping liquid.



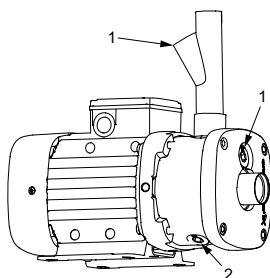
Pay attention to the direction of the vent hole during liquid filling and venting. Make sure that the escaping liquid does not cause damage to the motor or other components.

1. Make sure that the outlet pipe is empty and that the height from the centre of the inlet port to the first tapping point (H_1) meets the requirements. See the section on pipe connection (self-priming pumps).
2. Open the isolating valves in the inlet and outlet pipes.
3. Open a tap close to the pump so that air can escape.
4. Remove the filling plug in the pump. See the figure below.
5. If a filling plug has been installed in the outlet pipe, remove this plug and use this hole for filling. Otherwise, use the filling hole in the pump.
6. Fill the pump housing and the inlet pipe completely with liquid until a steady stream of liquid runs out of the filling hole.
7. Fit and tighten the filling plug(s).
8. Start the pump and wait until liquid is pumped. If you have used the filling hole in the pump, it may be necessary to repeat steps 1 to 8 to ensure that the pump is completely filled with liquid.



If connected to a frequency converter, the pump must run at maximum speed (3450 min^{-1}) during startup.

9. If the pump does not operate properly after several start attempts, see the section on fault finding the product.



Position of filling holes and drain hole

Pos.	Description
1	Filling hole
2	Drain hole



The pump is allowed to run for 5 minutes to attempt to suck liquid. If the pump does not build up pressure and flow, repeat steps 1 to 8.

Related information

4.2.2 Pipe connection (self-priming pumps)

10. Fault finding the product

6.3 Checking the direction of rotation

The description below applies to three-phase motors only.

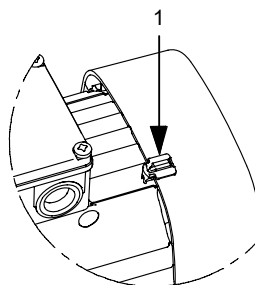
The motor fan cover has an installation indicator. See the figure below. Based on the motor cooling air, it indicates the direction of rotation of the motor.

Before you start the motor for the first time or if the position of the installation indicator has been changed, check that the installation indicator is working properly for instance by moving the indicator field with a finger.

To determine whether the direction of rotation is correct or wrong, compare the indication with the table below.

Indicator field	Direction of rotation
Black	Correct
White/reflecting	Wrong ²⁾

²⁾ To reverse the direction of rotation, switch off the power supply and interchange any two of the incoming supply wires.



Installation indicator

Pos.	Description
1	Indicator field

You can place the indicator in various positions on the motor, but do not place it between the cooling fins close to the screws that hold the fan cover.

The correct direction of rotation is also shown by arrows on the motor fan cover.

7. Service

DANGER

Electric shock

Death or serious personal injury



- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

WARNING

Corrosive liquids

Death or serious personal injury



- Wear personal protective equipment.

WARNING

Toxic liquids

Death or serious personal injury



- Wear personal protective equipment.

CAUTION

Hot or cold liquid

Minor or moderate personal injury



- Wear personal protective equipment.

CAUTION**Back injury**

Minor or moderate personal injury



- Use lifting equipment which is approved for the weight of the product.
- Use a lifting method suitable for the weight of the product.
- Wear personal protective equipment.

The internal pump parts are maintenance-free. You must keep the motor clean in order to ensure adequate cooling of the motor. If the pump is installed in dusty environments, clean the pump regularly. Take the enclosure class of the motor into account when cleaning.

The motor has maintenance-free, greased-for-life bearings.



Before startup after a period of inactivity, the pump and the inlet pipe must be completely filled with liquid.

Related information*6. Starting up the product***7.1 Contaminated products****CAUTION****Biological hazard**

Minor or moderate personal injury



- Flush the pump thoroughly with clean water and rinse the pump parts in water after disassembling.

The product will be classified as contaminated if it has been used for a liquid which is injurious to health or toxic. If you request Grundfos to service the product, contact Grundfos with details about the pumped liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the pumped liquid.

Clean the product in the best possible way before you return it. Costs of returning the product are to be paid by the customer.

7.2 Service documentation

Service documentation is available in Grundfos Product Center (<http://product-selection.grundfos.com/>).

If you have any questions, please contact the nearest Grundfos company or service workshop.

8. Taking the product out of operation**8.1 Cleaning**

Prior to a long period of inactivity, flush the pump with clean water to prevent corrosion and deposits in the pump.

Use acetic acid to remove possible lime deposits from the pump.

8.2 Frost protection

Pumps which are not being used during periods of frost must be drained to avoid damage.

Remove the filling and drain plugs from the pump. See the figure about position of filling and drain hole in the section on liquid filling.

Do not refit the plugs until the pump is taken into operation again.

Related information*6.1.1 Liquid filling***8.3 Taking the product permanently out of operation**

Observe the following if the pump is to be permanently taken out of operation and removed from the pipe system.

WARNING**Corrosive liquids**

Death or serious personal injury



- Wear personal protective equipment.

WARNING**Toxic liquids**

Death or serious personal injury



- Wear personal protective equipment.

CAUTION**Hot or cold liquid**

Minor or moderate personal injury



- Wear personal protective equipment.

CAUTION**Back injury**

Minor or moderate personal injury



- Use lifting equipment which is approved for the weight of the product.
- Use a lifting method suitable for the weight of the product.
- Wear personal protective equipment.

9. Storage

Store the product in its original packaging until installation. If the pump is to be stored for more than six months before being put into operation, apply a suitable corrosion inhibitor to the internal pump parts.

Keep the product in an enclosed, dry, and well-ventilated room at temperatures between $-30\text{ }^{\circ}\text{C}$ and $+60\text{ }^{\circ}\text{C}$.

Make sure that the corrosion inhibitor used does not affect the rubber parts with which it comes into contact.

Commercially available preservatives can be used for this purpose. Observe the manufacturer's instructions for application or removal.

10. Fault finding the product

DANGER

Electric shock

Death or serious personal injury



- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

WARNING

Corrosive liquids

Death or serious personal injury



- Wear personal protective equipment.

WARNING

Toxic liquids

Death or serious personal injury



- Wear personal protective equipment.

CAUTION

Hot or cold liquid

Minor or moderate personal injury



- Wear personal protective equipment.

CAUTION

Back injury

Minor or moderate personal injury



- Use lifting equipment which is approved for the weight of the product.
- Use a lifting method suitable for the weight of the product.
- Wear personal protective equipment.

10.1 The pump does not run

Cause	Remedy
Supply failure.	• Switch on the switch. • Check cables and cable connections for defects and loose connections.
Motor protection has tripped.	• Replace the contacts of the motor-protective circuit breaker, the magnet coil or the entire motor-protective circuit breaker. • Check cables and cable connections for defects, and replace the fuses. • Repair or replace the motor. • Switch off the power supply, and clean or repair the pump. • Set the motor-protective circuit breaker according to the rated current of the motor ($I_{1/1}$). See the nameplate.
Control-current circuit is defective.	Repair or replace the control-current circuit.

10.2 Motor-protective circuit breaker has tripped (trips immediately when power supply is switched on)

Cause	Remedy
Contacts of the motor-protective circuit breaker or magnet coil are defective.	Replace the contacts of the motor-protective circuit breaker, the magnet coil or the entire motor-protective circuit breaker.
Cable connection is loose or faulty.	Check cables and cable connections for defects, and replace the fuses.
Motor winding is defective.	Repair or replace the motor.
The pump is mechanically blocked.	Switch off the power supply, and clean or repair the pump.
The setting of the motor-protective circuit breaker is too low.	Set the motor-protective circuit breaker according to the rated current of the motor ($I_{1/1}$). See the nameplate.

10.3 The motor-protective circuit breaker trips occasionally

Cause	Remedy
The setting of the motor-protective circuit breaker is too low.	Set the motor-protective circuit breaker according to the rated current of the motor ($I_{1/1}$). See the nameplate.
Periodic supply fault.	Check cables and cable connections for defects, and replace the fuses.
Periodically low voltage.	• Check cables and cable connections for defects and loose connections. • Check that the power cable of the pump is correctly sized.

10.4 The motor-protective circuit breaker has not tripped, but the pump is inadvertently out of operation

Cause	Remedy
Supply failure.	• Switch on the switch. • Check cables and cable connections for defects and loose connections.
Motor protection has tripped.	• Replace the contacts of the motor-protective circuit breaker, the magnet coil or the entire motor-protective circuit breaker. • Check cables and cable connections for defects, and replace the fuses. • Repair or replace the motor. • Switch off the power supply, and clean or repair the pump. • Set the motor-protective circuit breaker according to the rated current of the motor (I_{1/1}). See the nameplate.
Control-current circuit is defective.	Repair or replace the control-current circuit.
The pump is mechanically blocked.	Switch off the power supply, and clean or repair the pump.

10.5 The pump performance is unstable

Cause	Remedy
Pump inlet pressure is too low.	Check for proper inlet conditions.
Inlet pipe is partly blocked by impurities.	Remove and clean the inlet pipe.
Leakage in the inlet pipe.	Remove and repair the inlet pipe.
Air in the inlet pipe or pump.	Vent the inlet pipe or pump. Check for proper inlet conditions.

10.6 The pump performance is unstable, and the pump is noisy

Self-priming pumps only:

Cause	Remedy
The differential pressure across the pump is too low.	Close the tap gradually until the outlet pressure is stable and the noise has ceased.

10.7 The pump runs, but gives no water

Cause	Remedy
Pump inlet pressure is too low.	Check for proper inlet conditions.
The inlet pipe is partly clogged by impurities.	Remove and clean the inlet pipe.
The foot or non-return valve is stuck in its closed position.	Remove and clean, repair or replace the valve.
Leakage in the inlet pipe.	Remove and repair the inlet pipe.
Air in the inlet pipe or pump.	Vent the inlet pipe or pump. Check for proper inlet conditions.

10.8 When startup is attempted, the pump starts, but delivers no pressure or flow

Self-priming pumps only:

Cause	Remedy
Liquid column above non-return valve in the outlet pipe prevents the pump from self-priming.	Empty the outlet pipe. Make sure that the non-return valve does not hold back liquid in the outlet pipe. Repeat the startup procedure in the section on pipe connection (self-priming pumps).
Inlet pipe draws in air.	Make sure that the inlet pipe is airtight from pump to liquid level. Repeat the startup procedure in the section on pipe connection (self-priming pumps) .

Related information

[4.2.2 Pipe connection \(self-priming pumps\)](#)

10.9 The pump runs, but does not deliver the rated flow

Self-priming pumps only:

Cause	Remedy
The internal valve did not close.	Close the tap gradually until a sudden rise in pressure or flow rate can be seen. Then open the tap gradually until you reach the required flow rate.

10.10 The pump runs backwards when switched off

Cause	Remedy
Leakage in the inlet pipe.	Remove and repair the inlet pipe.

10.11 The pump runs with reduced performance

Cause	Remedy
Pump inlet pressure is too low.	Check for proper inlet conditions.
Inlet pipe is partly blocked by impurities.	Remove and clean the inlet pipe.
Leakage in the inlet pipe.	Remove and repair the inlet pipe.
Air in the inlet pipe or pump.	Vent the inlet pipe or pump. Check for proper inlet conditions.

Related information

[6.3 Checking the direction of rotation](#)

11. Technical data

11.1 Enclosure class

- IP55 (standard)
- IPx5 (with motor drain plug removed).

11.2 Sound pressure level

The sound pressure level of the pumps is lower than 70 dB(A).

11.3 Ambient temperature



Self-priming pumps:
The liquid temperature must not exceed 60 °C (140 °F).

Maximum ambient temperature	Liquid temperature
55 °C (131 °F) ³⁾	90 °C (194 °F) ^{3) 4)}
50 °C (122 °F) ³⁾	100 °C (212 °F) ^{3) 4)}
45 °C (113 °F)	110 °C (230 °F) ⁴⁾
40 °C (104 °F)	120 °C (248 °F) ⁴⁾

³⁾ Does not apply for pumps with PSE approval (pumps approved for use in Japan).

⁴⁾ Only the stainless-steel variant (EN 1.4301 / AISI 304) is suitable for pumping liquids with temperatures above 90 °C (194 °F).

If the ambient temperature exceeds 55 °C (45 °C for pumps with PSE approval), do not fully load the motor due to the risk of overheating. In such cases, you may need to derate the motor output or use an oversize motor with a higher rated output. You can derate the CM pumps in relation to the ambient temperature without any consequence. Contact Grundfos for further information. See the figure below.



Derating in relation to the ambient temperature

11.4 Maximum system pressure and permissible liquid temperature

Material variant	Shaft seal	Permissible liquid temperature ⁵⁾		Maximum system pressure	
Cast iron (EN-GJL-200)	AVBx	-20 to 40 °C 41 to 90 °C	(-4 to 104 °F) (105.8 to 194 °F)	10 bar 6 bar	(145 psi) (87 psi)
	AQQx	-20 to 90 °C	(-4 to 194 °F)	10 bar	(145 psi)
Stainless steel (EN 1.4301 / AISI 304)	AVBx	-20 to 40 °C 41 to 90 °C	(-4 to 104 °F) (105.8 to 194 °F)	10 bar 6 bar	(145 psi) (87 psi)
	AQQx	-20 ⁶⁾ to 90 °C 91 to 120 °C ⁷⁾	(-4 to 194 °F) (195.8 to 248 °F)	16 bar 10 bar	(232 psi) (145 psi)
Stainless steel (EN 1.4401 / AISI 316)	AVBx	-20 to 40 °C 41 to 90 °C	(-4 to 104 °F) (105.8 to 194 °F)	10 bar 6 bar	(145 psi) (87 psi)
	AQQx	-20 ⁶⁾ to 90 °C 91 to 120 °C ⁷⁾	(-4 to 194 °F) (195.8 to 248 °F)	16 bar 10 bar	(232 psi) (145 psi)

⁵⁾ At liquid temperatures below 0 °C (32 °F), higher motor outputs may be needed due to increased viscosity, for instance if you have added glycol to the water.

⁶⁾ CM pumps for pumping liquids at temperatures below -20 °C (-4 °F) are available on request. Please contact Grundfos.

⁷⁾ 120 °C (248 °F) applies only if the pump has an AQQE shaft seal.

11.5 Minimum inlet pressure

You can calculate the minimum inlet pressure "H" in metres head required during operation to avoid cavitation in the pump from the following formula:

$$H = p_b \times 10.2 - \text{NPSH} - H_f - H_v - H_s$$

$$p_b = \text{Barometric pressure in bar.}$$

The barometric pressure can be set to 1 bar.

In closed systems, p_b indicates the system pressure in bar.

$$\text{NPSH} = \text{Net Positive Suction Head in metres head. To be read from the NPSH curves in the appendix at the highest flow rate the pump will be delivering.}$$

$$H_f = \text{Friction loss in inlet pipe in metres head.}$$

$$H_v = \text{Vapour pressure in metres head.}$$

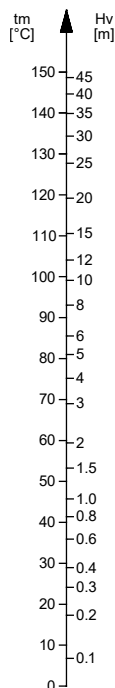
See the figure about vapour pressure in the appendix.

t_m = liquid temperature.

$$H_s = \text{Safety margin} = \text{min. 0.5 metres head.}$$

If the calculated value of "H" is positive, the pump can operate with a maximum suction lift of "H" metres.

If the calculated value of "H" is negative, a minimum suction head of "H" metres is required during operation to avoid cavitation.



Vapour pressure

TM003037

Example

$p_b = 1 \text{ bar}$.

Pump type: CM 3, 50 Hz.

Flow rate: $4 \text{ m}^3/\text{h}$.

NPSH (from the figure about NPSH curves for CM 3 in the appendix): 3.3 metres head.

$H_f = 3.0 \text{ metres head}$.

Liquid temperature: 90°C .

H_v (from the figure about vapour pressure in the appendix): 7.2 metres head.

$H = p_b \times 10.2 - \text{NPSH} - H_f - H_v - H_s \text{ [metres head]}$.

$H = 1 \times 10.2 - 3.0 - 3.3 - 7.2 - 0.5 = -3.8 \text{ metres head}$.

This means that a suction head of 3.8 metres is required during operation.

Pressure calculated in bar: $3.8 \times 0.0981 = 0.37 \text{ bar}$.

Pressure calculated in kPa: $3.8 \times 9.81 = 37.3 \text{ kPa}$.



[Click here to submit your feedback](#)

11.6 Maximum inlet pressure

The actual inlet pressure plus the pressure when the pump is operating against a closed valve must always be lower than the maximum system pressure.

12. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way.

1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

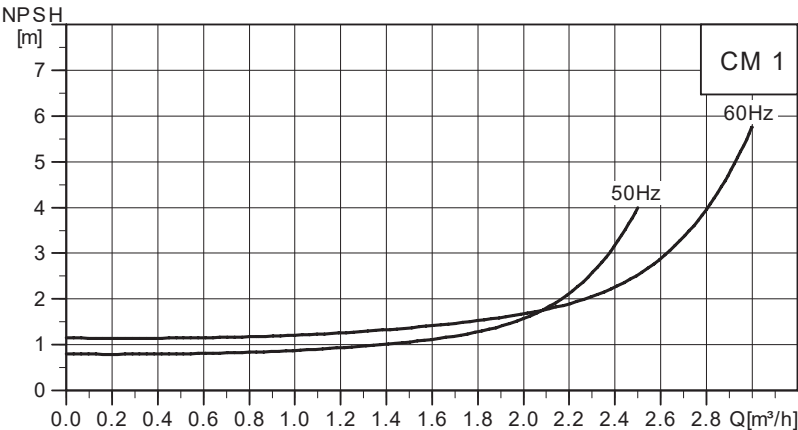
See also end-of-life information at www.grundfos.com/product-recycling.

13. Document quality feedback

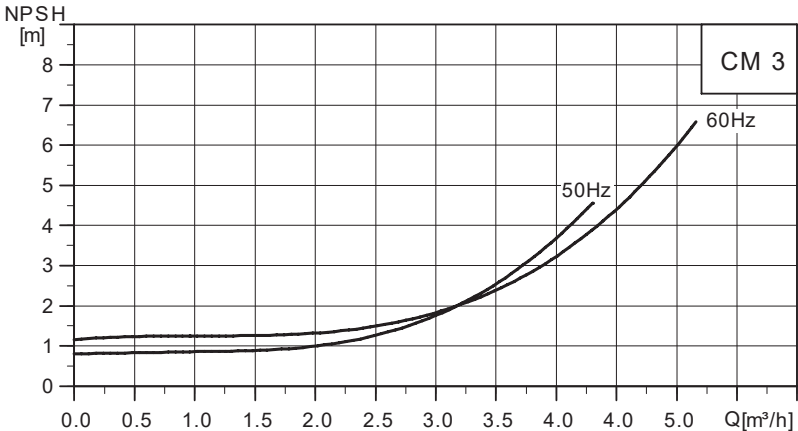
To provide feedback about this document, scan the QR-code using your phone's camera or a QR code app.

Appendix A

A.1. Appendix



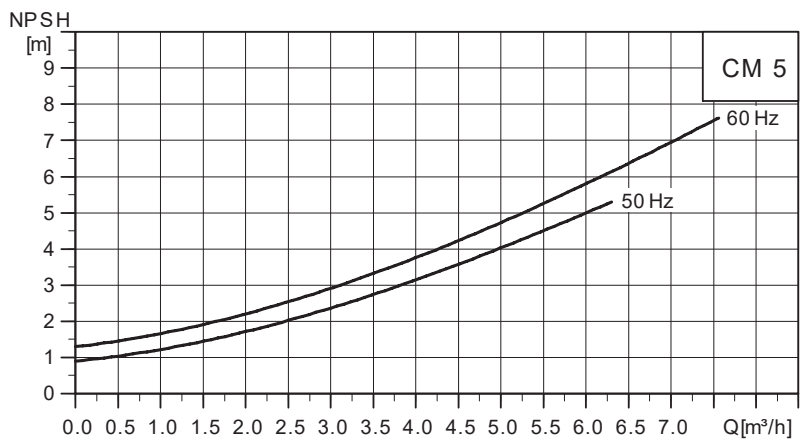
NPSH curves for CM 1



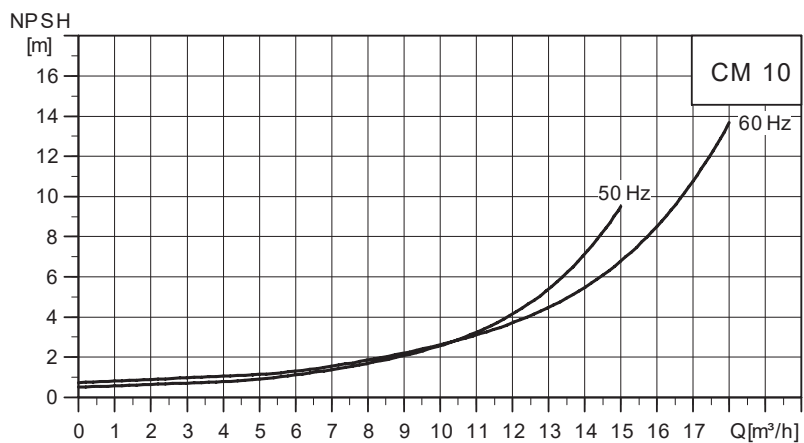
NPSH curves for CM 3

TM040458

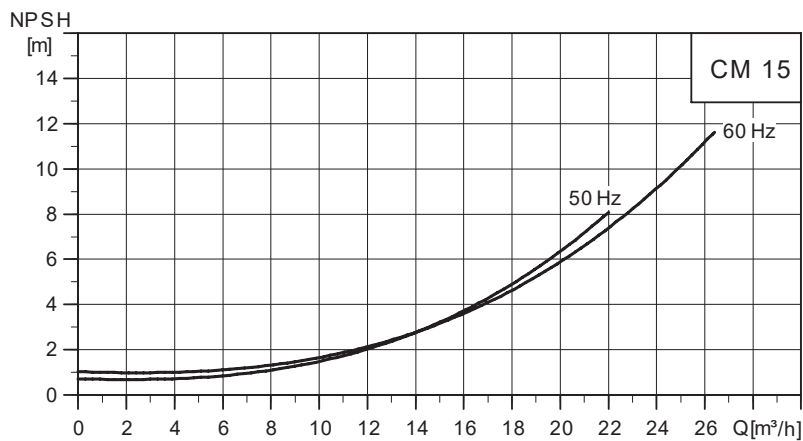
TM040459



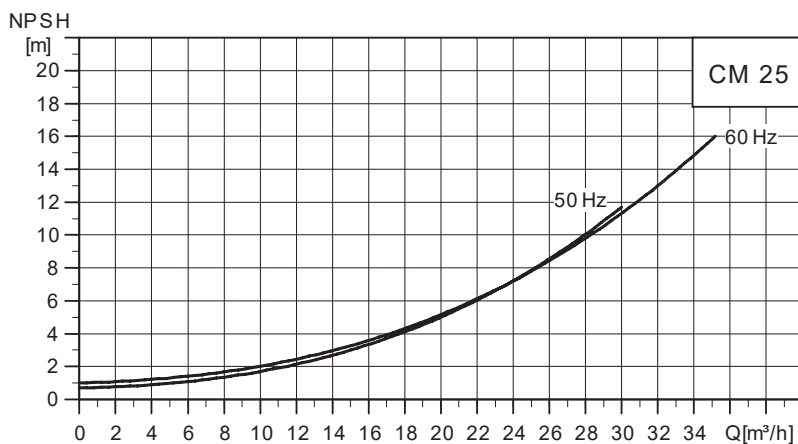
NPSH curves for CM 5



NPSH curves for CM 10



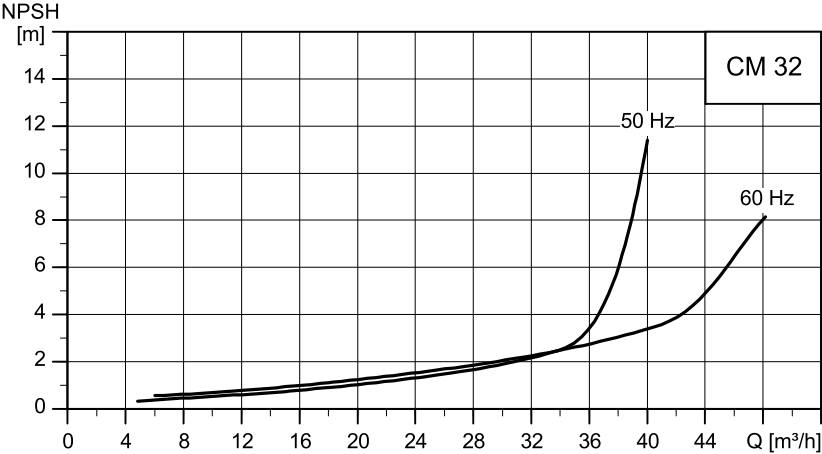
NPSH curves for CM 15



NPSH curves for CM 25

TM040462

TM04 0463



NPSH curves for CM 32

TM092544

安全上のご注意

1. Japanese warranty and safety statement

安全上のご注意

- ➔ ご使用（据付、運転、保守・点検等）の前に、必ずこの取扱説明書とその他の付属書類をすべて熟読し、正しくご使用ください。機器の知識、安全の情報そして、注意事項のすべてについて習熟してからご使用ください。
- ➔ この取扱説明書では、安全注意事項のランクを「危険」「注意」として区分してあります。

⚠ 危険 : 取扱いを誤った場合、危険な状態が起こりえて、死亡又は重傷を負う可能性が想定される場合。

⚠ 注意 : 取扱いを誤った場合、危険な状況が起こりえて、中程度の傷害や軽傷を負う可能性が想定される場合及び物的損害だけの発生が想定される場合。

なお、**⚠ 注意**に記載した事項でも、状況によっては重大な結果に結びつく可能性があります。

いずれも重要な内容を記載していますので必ず守ってください。

⚠ 危険
(全 般) ● 爆発性雰囲気中では使用しないでください。 ● メンテナンス等、保守の目的で作業する場合は、必ず電源を切って作業してください。 ● 運搬、設置、配管・配線、運転・操作、保守・点検の作業は、専門知識のある人が実施してください。感電、けが、火災等のおそれがあります。 (配管・配線) ● 電源ケーブルとの結線は、取扱説明書によって行ってください。感電や火災のおそれがあります。 ● ポンプの運転は、この取扱説明書に記されている容量の漏電ブレーカをつけて御使用ください。感電や火災等のおそれがあります。 (据付・調整) ● アース用端子を確実に接地してください。感電のおそれがあります。 (運 転) ● 運転中、回転体（シャフト、カップリング等）へは絶対に接近又は接触しないでください。巻き込まれ、けがのおそれがあります。 ● 停電した時は必ず電源スイッチを切ってください。けがのおそれがあります。 ● ポンプを締め切り状態や、取扱説明書に記載の最小流量以下での連続運転はしないでください。インペラの摩擦熱によって、液温が急激に上昇し、やけど、液漏れの原因となります。また、吸込み側に逆止弁（フート、チャッキ）を設置し、締めきり状態になった場合、ポンプ内部の圧力が使用圧力よりも急激に上昇することがあるため、ポンプまたは配管等が破裂し、けがをするおそれがあります。 ● 空運転（ポンプ内部に搬送液がない時の運転）はしないでください。ポンプ破損の原因となります。



注 意

(全 般)

- ポンプの仕様以外で使用しないでください。感電、けが、破損等のおそれがあります。
- ポンプ及び電動機の開口部に、指や物を入れないでください。感電、けが、火災等のおそれがあります。
- 損傷した電動機を使用しないでください。けが、火災等のおそれがあります。
- お客様による製品の改造は、当社の保証範囲外ですので、責任を負いません。
- 銘板を取り外さないでください。

(輸送・運搬)

- 運搬時は、落下、転倒すると危険ですので、十分ご注意ください。
- 装置に据え付けた後、ポンプのハンドルなどポンプ本体の部分を利用して、装置全体を吊り上げることは避けてください。
吊り上げる前に銘板、梱包箱、外形図、カタログ等により、ポンプの質量を確認し、吊り具の定格荷重以上のポンプは吊らないでください。
- 輸送・運搬時にポンプ本体に衝撃を与えないでください。液漏れ、異音やポンプ破損の原因となります。

(開 梱)

- 天地を確認の上、特に木枠梱包はクギに注意して開梱してください。けがのおそれがあります。
- 現品が注文通りのものかどうか、確認してください。間違った製品を設置した場合、けが、破損等のおそれがあります。

(据付・調整)

- ポンプは水平で十分に剛性のある面に据付してください。ポンプ破損のおそれがあります。
- ポンプを定常運転する前に本取扱説明書を参考にして、回転方向を確認してください。
けが、装置破損のおそれがあります。
- ポンプには絶対に乗らないようにしてください。ポンプの破損や、けがのおそれがあります。
- スターデルタ始動を行う場合、一次側に電磁開閉器付のもの（3コンダクタ方式）を選定してください。
火災のおそれがあります。
- 400V 級インバータで電動機を駆動する場合、インバータ側で抑制フィルタやリアクトルを設置するか、電動機側で絶縁を強化したものをご使用ください。
絶縁破壊による破損、火災のおそれがあります。
- 電動機の周囲には通風を妨げるような障害物を置いたり可燃物を置かないでください。
冷却が疎外され、異常加熱や火災、やけど等のおそれがあります。
- 運転前にはカップリングの締め付けボルトは確実に締め付けてください。
破片飛散によるけが、装置破損のおそれがあります。
- 電動機単体での回転方向の確認は行わないでください。カップリング取付時にシャフト位置調整が必要な為、シャフト位置不具合によりポンプを破損する原因となります。

(配管・配線)

- 配線は、電気設備技術基準や内線規程にしたがって施工してください。焼損や火災のおそれがあります。
- 電動機保護装置が電動機に内蔵されていません。
過負荷保護装置は電気設備技術基準により取付が義務づけられています。
過負荷保護装置以外の保護装置（漏電遮断器等）も設置することを推奨します。
焼損や火災のおそれがあります。



注 意

(運 転)

- 運転中、電動機はかなり高温になります。手や体を触れないようにご注意ください。やけどのおそれがあります。
- 異常が発生した場合は直ちに運転を停止してください。感電、けが、火災等のおそれがあります。
- 一般仕様のポンプを許容以上の高温液（カタログの許容液温を御参照下さい）には使用しないで下さい。ポンプが故障し、漏電や感電などの原因となります。
- 過多な起動、停止はしないでください。ポンプを早く傷める場合があります。
- 急な温度・圧力・流量変動をなくして運転してください。ポンプの故障の原因となります。
- 使用可能流量域でご使用ください。それ以外での使用はポンプの故障の原因となります。詳しくはカタログをご参照ください。

(保守・点検)

- 絶縁抵抗測定の際は、ポンプ本体に触れないでください。感電のおそれがあります。
- ポンプの本体は高温になるので、素手でさわらないでください。やけどのおそれがあります。
- グリースニップル付の電動機は電動機に取り付けられている潤滑容量に従って、定期的にグリース補給をしてください。

(修理・分解・改造)

- 修理、分解は、必ず専門の人間が行ってください。改造は行わないでください。感電、けが、火災等のおそれがあります。

(廃 棄)

- 電動機及びポンプを廃棄する場合は、一般産業廃棄物として処理してください。

安全のために次のことは必ず守ってください



安全上の注意事項

正しくお使いいただくために、ご使用前に必ず取扱説明書をお読みください。

また安全上、下記事項は特に注意してください。

- (1) この機器の回転部に接触すると重傷を負う可能性がありますので、関係者以外は操作出来ない配慮をしてください。
- (2) 周囲に爆発性、引火性、腐食性ガスのない場所に設置してください。
- (3) ご使用前に必ず接地（アース）を取り付けてください。
- (4) 部品を取り外して他の機器に使用したり、指定以外の商品を使用しないでください。
- (5) 仕様書、契約書、取扱説明書に記載された運転条件以外では、絶対に運転しないでください。
- (6) この製品は8歳以上の子供、身体感覚や精神的能力の低下した人物、または経知識不足の人物であっても適切な管理者から製品の安全な使用について説明を受けた後、それに伴う危険を理解していなければ使用することができません。子供にこの製品で遊ばせないでください。監督なしで子供にクリーニングおよびメンテナンスを行わせしないでください。

「安全上のご注意」を逸脱した取扱いによって発生した事故の責任は一切負いません。

保 証

保証期間は納入日より1ヶ年といたします。ただし、保証は日本国内で使用される場合に限りです。

保証期間中に本取扱説明書に従った製品仕様範囲内の正常な使用状態で故障を生じた場合は、故障部分の交換又は修理を無償で行います。この場合、無償交換、修理は、納入品の故障、破損部分の交換又は修理に限られ、その他の費用の負担、損害についての責任は免除させていただきます。

但し、次に該当する場合は、この保証の範囲から除外させていただきます。

- (1) 不適当な取り扱い、使用、ならびに保存により生じた故障、破損
- (2) 納入品以外の機器が原因による故障、破損
- (3) 当社以外の修理、改造による故障、破損
- (4) 当社指定品以外の部品を使用した場合の故障、破損
- (5) 火災、地震、天災などの災害および不可抗力による故障、破損

修 理 ・ ア フ タ ー サ ー ビ ス

納入品に故障があることを発見したときは、直ちに購入先または弊社サービスまでご連絡下さい。

保証期間内にご連絡が無い場合は、故障、破損部分の交換又は修理は有償となります。

また、いかなる場合においても、その他の費用の負担、損害についての責任は免除させていただきます。

故障の連絡の際、銘板記載事項（型式、製造番号など）と故障状況をお知らせください。

消 耗 部 品 と 定 期 点 検

消耗部品交換の目安（清水）

ポンプ部	3～4年に一度
電動機部	1～2年に一度

定期点検

長期に渡り安定した性能を得る為には、1年に一度点検を施し、異常が無いか、変化が無いか以下の点を調査・測定し記録し対策をしてください。

流量、圧力：異常がある場合は、設置・使用状況の確認に加えて、ポンプ部の分解点検をします。

電流値、絶縁抵抗値：電動機交換等の処理をします。

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